

What is claimed is:

[Claim 1] An optical head apparatus, comprising:
a single monolithic semiconductor substrate having at least a first side and a second side; the first side including an air bearing surface;
a laser integral with the first side having an emission facet substantially co-planer with the air bearing surface; and
a contact pad on the second side electrically bridged to the laser.

[Claim 2] The optical head apparatus of claim 1, wherein the contact pad is electrically bridged to the laser by a conductive via extending from the laser around a corner of the substrate along the second side of the substrate connecting to the contact pad.

[Claim 3] The optical head apparatus of claim 1 wherein the laser is defined by one of an oxidized and ion-implanted region.

[Claim 4] The optical head apparatus of claim 1, further comprising a slider portion integral with the semiconductor substrate next to the air bearing surface wherein electrical connection to the contact pad does not interfere with aerodynamic operation of the slider portion.

[Claim 5] The optical head apparatus of claim 4 wherein the contact pad on the second side is recessed with respect to the emission facet and the air bearing surface.

[Claim 6] An apparatus comprising a single semiconductor substrate having a first region and a second region, the first region defining a slider, the slider including an air bearing surface, the second region defining a laser, the laser including a first contact and a second contact.

[Claim 7] The apparatus of claim 6 wherein the first contact is a p-electrical contact and the second contact is an n-electrical contact.

[Claim 8] The apparatus of claim 7 wherein the p-electrical contact is adjacent to a p-clad layer and proximate to an emission face, and an n-electrical contact adjacent to an n-clad layer.

[Claim 9] The apparatus of claim 8 wherein the first and second contacts define a laser diode.

[Claim 10] The apparatus of claim 6 wherein the second region comprises a vertical cavity surface emitting laser, the emitting laser having an emission facet which is substantially co-planar with the air bearing surface.

[Claim 11] The apparatus of claim 10 wherein the second region is defined by an oxidized or ion-implanted region in a p-DBR mirror stack.

[Claim 12] The apparatus of claim 7 wherein the p-electrical contact is recessed with the first and second regions.

[Claim 13] An apparatus comprising a single monolithic device including an aerodynamic slider and at least one laser wherein the laser includes an aperture in an emission facet, the monolithic device being mounted on a read/write arms via a suspension mechanism, the device being used to read and write on an optical media.

[Claim 14] The apparatus of claim 13 wherein a width “w” of the aperture is of smaller dimension than an output wavelength “ λ ” of the laser.

[Claim 15] The apparatus of claim 14 wherein a reflective read/write surface of optical media during a read/write operation is positioned at an optical path-length “l” from the emission facet is less than the output wavelength “ λ ”.

[Claim 16] The apparatus of claim 13 wherein the optical media comprises “phase change” media.

[Claim 17] The apparatus of claim 16 wherein the “phase change” media comprises GeTeSb materials.

[Claim 18] The apparatus of claim 17 wherein the media comprise a phase change layer positioned between a protective overcoat and a base or substrate.

[Claim 19] The apparatus of claim 13 wherein the optical media comprises an outer overcoat of a diamond-like carbon or protective material, a first dielectric layer, a phase change layer, a second dielectric layer, a metal layer, a third dielectric layer, and a base or substrate.

[Claim 20] The apparatus of 19 wherein the dielectric layers comprises ZnS:SiO₂.

